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WEAA, 417A - UK

2. P: **9818358.5**
(This is my part)

24 AUG 1998

3. Full name, address and postcode of the or of each applicant (underline all surnames)

Weatherford/Lamb, Inc.
c/o CSC - The United States Corporation Company
1013 Centre Road
Wilmington
Delaware 19805
USA *819581005*
USA, Delaware

Patents ADP number (*if you know it*)

If the applicant is a corporate body, give the country/state of its incorporation

4. Title of the invention**AN APPARATUS FOR FACILITATING THE CONNECTION OF TUBULARS USING A TOP DRIVE****5. Name of your agent (*if you have one*)****"Address for service" in the United Kingdom to which all correspondence should be sent (*including the postcode*)**

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 7271125001*

Patents ADP number (*if you know it*)**05815709001****6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (*if you know it*) the or each application number**Country Priority application number
(if you know it) Date of filing
*(day / month / year)***7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application**Number of earlier application Date of filing
*(day / month / year)***8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if:**

- a) any applicant named in part 3 is not an inventor, or
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Description 7

Claim(s) 2

Abstract 1

Drawing(s) 3 + 3

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Priority documents

Translations of priority documents

Statement of inventorship and right to grant of a patent (Patents Form 7/77)

TWO

Request for preliminary examination and search (Patents Form 9/77)

ONE

Request for substantive examination
(Patents Form 10/77)

Any other documents
(please specify)

11.

I/We request the grant of a patent on the basis of this application.

Signature

Date

16.7.98

12. Name and daytime telephone number of person to contact in the United Kingdom

Brian Lucas - 01883 626211

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An Apparatus for Facilitating the Connection
of Tubulars Using a Top Drive

This invention relates to an apparatus for facilitating the connection of tubulars using a top drive and 5 is, more particularly but not exclusively, intended for facilitating the connection of a section or stand of casing to a string of casing.

In the construction of oil or gas wells it is usually necessary to line the borehole with a string of 10 tubulars known as casing. Because of the length of the casing required, sections or stands of say two sections of casing are progressively added to the string as it is lowered into the well from a drilling platform. In particular, when it is desired to add a section or stand 15 of casing the string is usually restrained from falling into the well by applying the slips of a spider located in the floor of the drilling platform. The new section or stand of casing is then moved from a rack to the well centre above the spider. The threaded pin of the section or stand of casing to be connected is then located 20 over the threaded box of the casing in the well and the connection is made up by rotation therebetween. An elevator is then connected to the top of the new section or stand and the whole casing string lifted slightly to enable the slips of the spider to be released. The 25 whole casing string is then lowered until the top of the section is adjacent the spider whereupon the slips of the spider are re-applied, the elevator disconnected and the process repeated.

It is common practice to use a power tong to torque 30 the connection up to a predetermined torque in order to make the connection. The power tong is located on the platform, either on rails, or hung from a derrick on a chain. However, it has recently been proposed to use a 35 top drive for making such connection.

Because of the high costs associated with the construction of oil and gas wells time is critical and it has been observed by the applicants that the time to connect a tubular to a top drive using existing equipment could be reduced.

Accordingly there is provided an apparatus for facilitating the connection of tubulars using a top drive, which apparatus comprises a body connectable to said top drive, said body comprising at least one gripping element radially displaceable by hydraulic or pneumatic fluid to drivingly engage said tubular.

Other features of the invention are set out in Claims 2 to 12.

The present invention also provides an apparatus for facilitating the connection of tubulars using a top drive, said apparatus comprising a body connectable to said top drive, said body comprising at least one gripping element radially displaceable to drivingly engage said tubular and a sealing packer to inhibit, in use, fluid in said tubular from escaping therefrom.

Preferably, said sealing packer can be actuated by hydraulic or pneumatic fluid.

The present invention also provides a top drive having an apparatus in accordance with the present invention attached thereto.

For a better understanding of the invention, reference will now be made, by way of example, to the accompanying drawings, in which:

5 Figure 1 is a cross-sectional side view of a first embodiment of an apparatus in accordance with the present invention inserted in a section of casing;

Figure 2 shows the apparatus of Figure 1 connected to a top drive and inserted in a section of casing; and

10 Figure 3 shows a cross-sectional side view in perspective of part of a second embodiment of an apparatus in accordance with the present invention.

Referring to Figure 1 there is shown an apparatus which is generally identified by reference numeral 1.

15 The apparatus 1 comprises a cylindrical body 2 which has a central passage 3 therethrough. The cylindrical body 2 has circumferentially spaced recesses 4 thereabout in which respective gripping elements 5 are located.

20 The upper part 6 of the cylindrical body 2 is of a reduced outer diameter. The upper part 6 passes through a rotary transmission 7 and is rotatably supported by two bearings 8, 9 which are arranged in corresponding channels 10, 11 in an annular support 12. A circumferentially raised portion 13 between the two bearings 8, 9 25 is provided in the upper part 6 to inhibit longitudinal movement of the cylindrical body 2.

The rotary transmission 7 is mounted fast on the annular support 12 and is in sealing tight relation with the upper part 6 which is rotatable relative thereto. 30 The rotary transmission 7 is provided with a feed passage 14 which is at one end in fluid communication with a feed passage 15 in the annular support 12 and with a feed line 16. The other end of the feed passage 14 is in fluid communication with a radial channel 17. Feed 35 passages 18 are provided in the cylindrical body 2 to

link the radial channel 17 with the circumferential recesses 4 behind each gripping element 5.

5 The upper part 6 is provided with internal splines 19 along the upper part of the passage 3. The lower end of a connecting member 20 is provided with corresponding external splines and is located in the upper part of the passage 3. The upper end of the connecting member 20 is provided with a circulating canal 22 and threads 23 for connection to a top drive (Figure 2).

10 The support member 12 is provided with two axles 24, 25 to which compensating cylinders 26, 27 are attached, the corresponding pistons 28, 29 being, in use, connected to the body of the top drive (Figure 2).

15 Gripping elements 5 are preferably based on the construction described in PCT Publication No. WO 94/05894 which is incorporated herein for all purposes, and sold by the applicants under the trade mark "MICRO-GRIP".

20 The gripping elements comprise a plurality of strips (not shown) which are embedded side by side in a resilient base member (not shown) and each of which has a pipe gripping edge (not shown) wherein the strips project beyond said resilient base member to form channels between adjacent strips to accommodate debris 25 from the surface of the casing to be gripped. This type of gripping element allows rotational torque to be applied to the tubular and longitudinal forces produced by circulating fluid within the tubular and the weight of the tubular to be taken..

30 The cylindrical body 2 is shown in Figure 1 in a section of casing 30 with gripping elements 5 in a radially extended position, engaging the inner wall 31 of the section of casing 30 beneath a threaded box 32.

35 In use, the pistons 28, 29 are connected to the stator 34 of the top drive 33 (Figure 2). The rotor 35

of the top drive 33 is connected to the connecting member 20. The section of casing 30 is positioned over the upper portion of a casing string using, for example a pipe positioning device. The top drive 33 with the
5 attached apparatus 1 is lowered so that the cylindrical body 2 thereof enters the casing 30. Alternatively, the section or stand of casing may be brought towards the apparatus 1 using the methods and apparatus disclosed in
co pending UK Patent Application No. ... entitled
10 "Methods and Apparatus for Facilitating the Connection of Tubulars Using a Top Drive" filed by the applicant for the present application on even date herewith. If the support member 12 hits the top of the threaded box 32, the compensating cylinders 26, 27, which contain
15 compressed air, cushions the impact whilst the splines 19, 21 in the upper part 6 of the cylindrical body 2 will allow relative longitudinal movement between the apparatus 1 and the top drive 33 whilst being able to transmit rotation therebetween. Although the compensating cylinders may be hydraulic and/or may be use a
20 pneumatic bellows system.

Hydraulic pressure is applied through feed line 16 feed passage 15, feed passage 14, radial channel 17, and feed passage 18 into recess 4 behind gripping elements
25 5, forcing the gripping elements 5 radially outwardly to engage the inner wall 31 of the casing 30.

The top drive 33 may now be used to rotate the rotor 35 which in turn rotates the connecting member 20, the cylindrical body 2 and hence the casing 30. The
30 compensating cylinders 26, 27 will allow a small downward movement as the threaded pin on the bottom of the casing enters the box on the top of the string.

Once the joint is correctly tightened the elevator 37 is swung into position and the elevator slips therein
35 (not shown) are actuated to grip the casing 30 beneath

the box 32. The top drive 33 is then raised a small amount using the drawworks to enable the slips in the spider to be released and the top drive and casing string is then lowered.

5 As the casing is lowered liquid may be introduced into the casing 30 via the connecting canal 2 and the central passage 3. The introduction of such liquid is often desirable to facilitate the lowering of the casing.

10 Referring to Figure 3 there is shown an apparatus in accordance with the present invention which is generally identified by reference numeral 101.

15 The apparatus 101 is generally similar to that of Figure 1, in that it comprises a cylindrical body 102 which has a central passage 103 therethrough. The cylindrical body 102 has recesses 104 thereabout in which gripping elements 105 are located. The gripping elements 105 are provided with recesses 106.

20 The cylindrical body 102 is also provided with a cylindrical sealing packer 107 arranged below the gripping elements 105. The cylindrical sealing packer 107 is provided with a recess 108. The cylindrical sealing packer 107 which is made from an elastomeric material is fast with the cylindrical body 102.

25 The cylindrical body 102 is provided with a feed passage 109 which is at the upper end connected to a hydraulic fluid supply, and at the other, to the recesses 106 and 108 in the gripping elements 105 and the cylindrical sealing packer 107 respectively.

30 In use, the apparatus 101 is connected to a top drive, such as that shown in Figure 2 and is inserted into the top of a section or stand of casing 110. Hydraulic fluid pressure is applied through feed passage 109 into recesses 106 and 108 which moves the gripping elements 105 into engagement with the inner wall 111 and

the cylindrical sealing packer 107 into contact with the inner wall 111. The gripping elements 105 engage with the inner wall 111 of the casing 110 so that rotational force can be transmitted from the apparatus 101 to the 5 casing 110. The sealing packer 107 substantially prevents any fluids such as mud from escaping between the apparatus 101 and the casing 110. This is particularly advantageous where it is desired to circulate fluid to facilitate running the casing. In particular, if the 10 casing string becomes lodged on an obstruction liquid can be pumped down the casing string under high pressure to remove the obstruction. The sealing packer 107 facilitates this operation by inhibiting liquid under high pressure escaping through the top of the casing 30.

15 It is envisaged that the apparatus as described above could be used in conjunction with any of the apparatus and used with any methods as described and shown in co-pending UK Application No's. and entitled 20 and filed by the applicant for the present application on even date herewith.

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CLAIMS

1. An apparatus for facilitating the connection of tubulars using a top drive, which apparatus comprises a body (2; 102) connectable to said top drive, said body
5 (2; 102) comprising at least one gripping element (5; 105) radially displaceable by hydraulic or pneumatic fluid to drivingly engage said tubular (30; 110).
2. An apparatus as claimed in Claim 1, wherein said at least one gripping element (5; 105) is movable radially
10 outwardly from said body (2; 102) to engage the inside wall (31; 111) of said tubular (30; 110).
3. An apparatus as claimed in Claim 1 or 2, wherein said body (2; 102) is connectable to a rotor (35) of said top drive in order to rotate said apparatus.
- 15 4. An apparatus as claimed in Claim 1, 2 or 3, further comprising a sealing packer (107) for engagement with said tubular.
5. An apparatus as claimed in Claim 4, wherein said sealing packer (107) can be activated by hydraulic or
20 pneumatic fluid.
6. An apparatus as claimed in any preceding claim, wherein said body (2; 102) is provided with a passage (3; 103) therethrough to allow excess fluid in said tubular to escape therefrom.
- 25 7. An apparatus as claimed in any preceding claim, further comprising a support (12) which is connectable to a stator of said top drive.
8. An apparatus as claimed in Claim 7, further comprising compensating pistons (26, 27) attached to said
30 body (2; 102) and connectable to said top drive.
9. An apparatus as claimed in Claim 8, wherein said compensating pistons (26, 27) are pneumatically operable and are adjustable to compensate for different weights of tubular.
- 35 10. An apparatus as claimed in any preceding claim,

wherein an upper part of said body (2) comprises a splined recess into which a splined rotor or splined connecting member (20) may be located.

11. An apparatus as claimed in Claim 7, 8 or 9, wherein
5 said support (12) is arranged circumjacent an upper part
of said body (2) with a bearing (8, 9) arranged there-
between to allow said body (2) to rotate with respect to
said support (12).
12. An apparatus as claimed in Claim 7, further com-
10 prising a rotary transmission (7) to allow hydraulic or
pneumatic fluid to pass through said body (2; 102).
13. An apparatus for facilitating the connection of
tubulars using a top drive, said apparatus comprising a
body (102) connectable to said top drive, said body
15 (102) comprising at least one gripping element (105)
radially displaceable to drivingly engage said tubular
(110) and a sealing packer (107) to inhibit, in use,
fluid in said tubular from escaping therefrom.
14. An apparatus as claimed in Claim 13, wherein said
20 sealing packer can be actuated by hydraulic or pneumatic
fluid.
15. A top drive having an apparatus as claimed in any
preceding claim attached thereto.

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ABSTRACT

An Apparatus for Facilitating the Connection
of Tubulars Using a Top Drive

An apparatus for facilitating the connection of
5 tubulars using a top drive, which apparatus comprises a
body (2; 102) connectable to said top drive, said body
(2; 102) comprising at least one gripping element (5;
105) radially displaceable by hydraulic or pneumatic
fluid to drivingly engage said tubular (30; 110).

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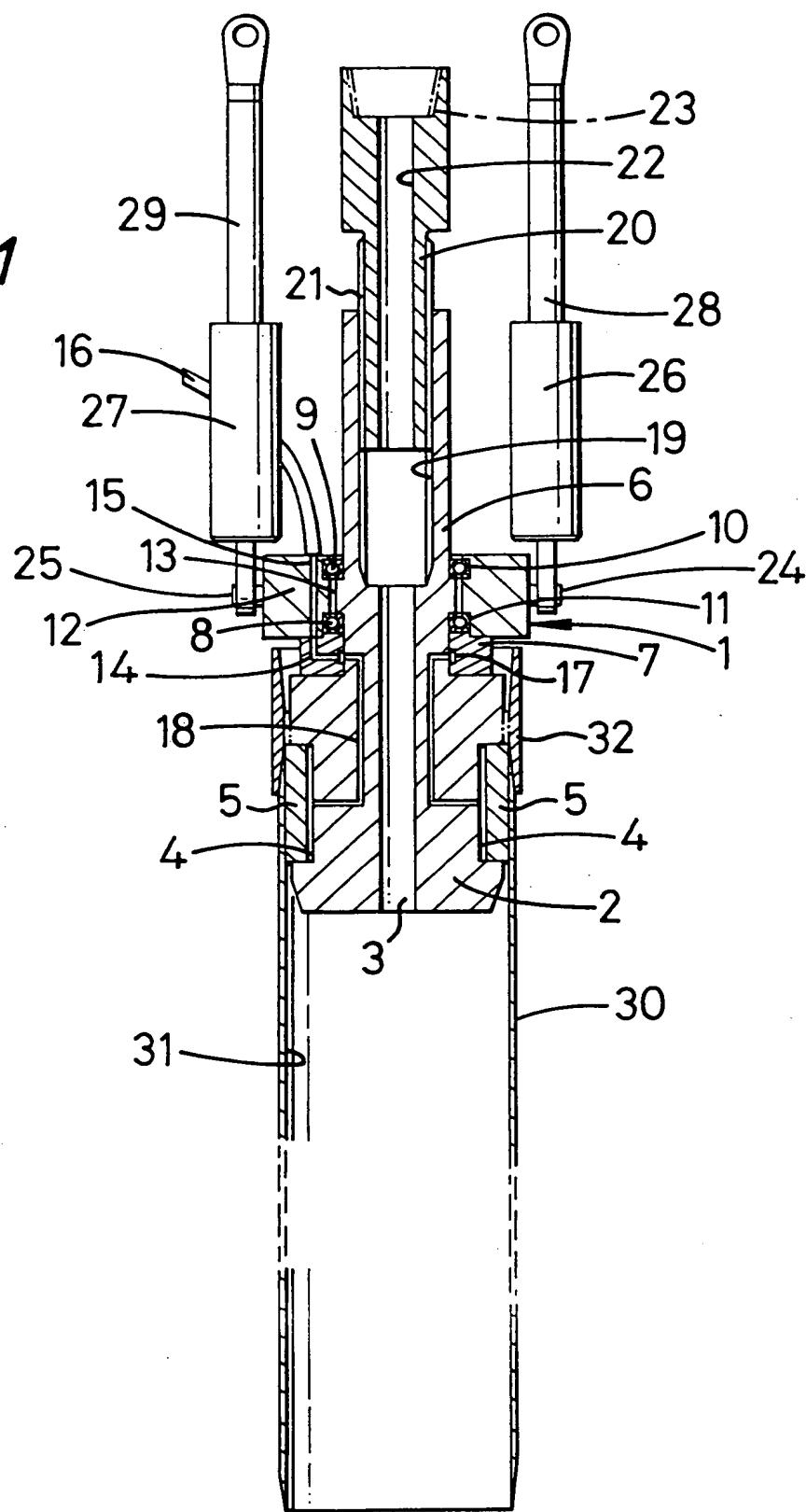
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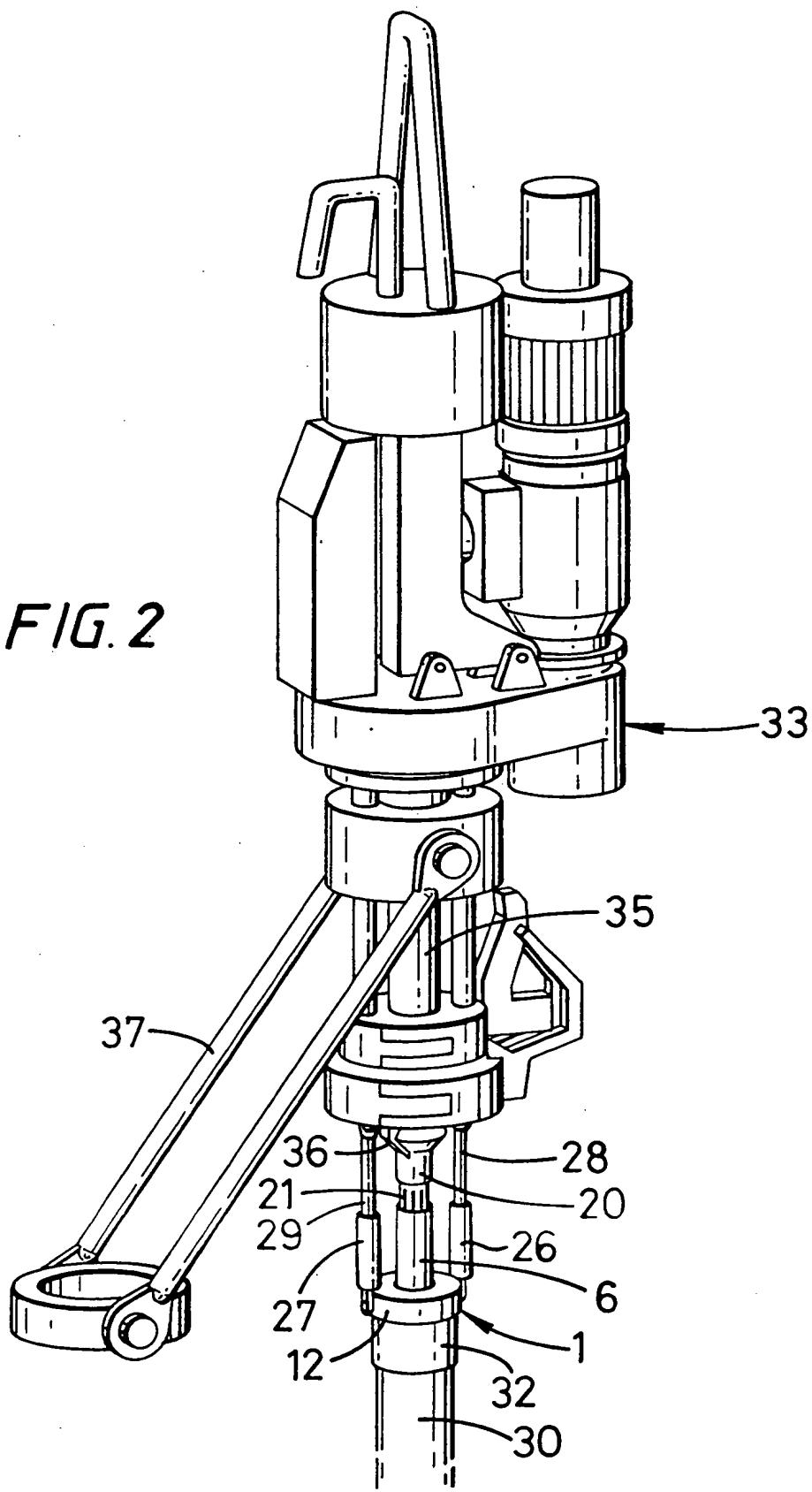
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1/3

FIG. 1



2/3



3/3

FIG. 3

